What is claimed is:

1. A calciner kiln for producing cement from raw kiln material comprising:

a preheater having a plurality of cyclone stages for heating said raw kiln material;

a calciner having a calciner combustion chamber and a calciner loop duct for calcining the raw kiln material;

an in-line calciner duct in included in said loop duct;

a rotary cement kiln having a charge end and a discharge end for producing clinker from the calcined raw kiln material;

a riser duct disposed between said in-line calciner duct and said charge end of said rotary kiln so that said riser duct and in-line calciner duct are in-line with a flow of hot kiln gas from said charge end of said rotary kiln;

a raw kiln material feed for feeding raw kiln material into said combustion chamber;

a waste material feed system for continuously feeding solid waste derived fuel (SWDF) material into said combustion chamber;

said calciner combustion chamber having a controlled environment for burning said SWDF in the presence of the raw kiln material for calcining the raw kiln material;

a connector duct connecting said calciner combustion chamber and calciner duct for delivering the calcined kiln material, heat of combustion, and any

ashes of non-combustible material to said in-line calciner duct at an entry zone above said riser duct.

2. The apparatus of claim 1 including a clinker cooler connected to the discharge end of said rotary kiln for cooling clinker produced in said rotary kiln using air passing through the clinker cooler; and at least one air inlet connected to said combustion chamber in communication with said clinker cooler delivering tertiary air to said combustion chamber from said clinker cooler for use as combustion air having an oxygen content generally equal to that of ambient air.

3. The apparatus of claim 1 wherein said combustion chamber includes a burner producing a burner flame to control the temperature in said calciner combustion chamber and combustion of said SWDF material.

4. The apparatus of claim 3 including an air inlet for introducing combustion air into said combustion chamber having a high oxygen content generally equal to or greater than that of ambient.

5. The apparatus of claim 3 including a fuel control regulating the feed of a control fuel to said burner; said control fuel providing a more spontaneous combustion than said SWDF material to provide a more effective control over the temperature in said calciner combustion chamber.

6. The apparatus of claim 1 wherein said preheater includes an intermediary cyclone stage for collecting the raw kiln material, and said raw kiln material feed supplies said raw kiln material to a feed inlet of said combustion

chamber; and said preheater including a bottom separation cyclone for collecting calcined raw material and feeding the calcined raw material to said rotary kiln.

7. The apparatus of claim 6 including a control element for splitting the feed of raw kiln material between said calciner combustion chamber and in-line calciner duct.

8. The apparatus of claim 6 wherein said waste material feed system includes a feed control for feeding said SWDF material to said calciner combustion chamber at a controlled amount.

9. The apparatus of claim 1 wherein said waste feed system for feeding SWDF material to said combustion chamber includes a feed hopper for accumulating said SWDF material in a shredded form, and a auger feed for feeding said SWDF material from said hopper to said combustion chamber.

10. The apparatus of claim 9 wherein said auger feed includes a compression section and an expansion section wherein a compressed plug of said shredded SWDF material is produced in said compression section and is fed to said expansion section for feeding into said combustion chamber through an auger feed outlet.

11. The apparatus of claim 10 wherein said compressed plug of SWDF material expands in said expansion section of said auger feed and falls generally freely through said outlet by gravity into said combustion chamber as loose shredded material.

12. The apparatus of claim 11 including a first shutoff gate disposed between said compression section and said expansion section of said auger feed; and a second shutoff gate disposed near said auger feed outlet, said shutoff gates being operable to open and close the feed of SWFD material through said auger feed.

13. The apparatus of claim 12 wherein said first shutoff gate has an open position to allow feed of SWDF material through said auger feed and a closed position to block the feed of SWDF material to said expansion section; and said second shutoff gate has an open position to allow feed of SWDF material to said auger feed outlet and a closed position to block the feed of SWDF material to said auger feed outlet; and a controller for controlling the open and closed positions of said first and second shutoff gates.

14. The apparatus of claim 13 wherein said controller positions said first and second shutoff gates in their closed positions in response to a controller input to shut down the SWDF feed system so that hot combustion gas and fire from the combustion chamber are not allowed to flow backward through the feed system.

15. The apparatus of claim 14 wherein said controller operates said auger in a reverse operation prior to moving said first and second shutoff gates to said closed positions to release the compression of said compressed plug in said compression section of said auger feed.

16. The apparatus of claim 9 including a feed conveyor for feeding the SWDF material to said auger feed hopper.

17. The apparatus of claim 16 including an enclosure enclosing said feed conveyor; and including means filling said enclosure with an inert gas to prevent combustion of said conveyer SWDF material.

18. The apparatus of claim 17 including a conveyor controller for controlling the feed rate of SWDF material to said feed hopper so that a desired fill of SWDF material is maintained in said feed hopper.

19. The apparatus of claim 17 wherein said conveyor includes an upper air belt conveyance run wherein said conveyor belt is open for conveying loose shredded waste material for delivery, and a closed lower run in which opposing edges are folded to form a belt enclosure wherein any residual loose material is prevented from falling into the housing.

20. The apparatus of claim 9 including a fuel conditioner bin for containing fuel conditioner; and a bin outlet for feeding said fuel conditioner to said feed hopper of said auger feed to mix with said SWDF material enhancing the flowability of said SWDF material.

21. The apparatus of claim 20 including a bin control valve disposed in the outlet feed of said fuel conditioner bin to control the flow of fuel conditioner into said feed hopper of said feed system.

22. The apparatus of claim 21 including a controller for controlling the control valve of said fuel conditioner bin feeder; and said controller controlling said control valve upon receipt of a signal to close down said combustion chamber to

apply sufficient amount of fuel conditioner to cover the top of said SWDF material in said hopper feeder to prevent combustion air from entering the hopper.

23. In a calciner kiln for producing cement from raw kiln material including a preheater for heating said raw kiln material; a calciner for thermally decomposing said raw material; a rotary cement kiln for producing clinker having a charge end and a discharge end; said calciner being in communication with said charge end of said rotary kiln for receiving hot kiln gas from said kiln; and a clinker cooler connected to said discharge end of said rotary kiln for cooling clinker falling into said clinker; a system for continuously feeding and burning solid waste derived fuel (SWDF) material in the calciner comprising:

a calciner combustion chamber;

a kiln feed for feeding raw kiln material to said calciner combustion chamber;

a waste material feed system for continuously feeding SWDF material at a controlled rate to said calcine combustion chamber for burning;

a burner for producing a flame in said calciner combustion chamber having a burner fuel control for feeding a control fuel to the burner to control the temperature in said combustion chamber; and

said calciner combustion chamber having a high oxygen, controlled temperature environment for burning SWDF material and control fuel to a generally complete burnout for calcining said raw kiln material.

24. The apparatus of claim 23 including a riser duct connected between said charge end of said rotary kiln and said calciner, said combustion chamber introducing hot combustion gas generally above said riser duct for mixing with the hot kiln gas flowing through the riser duct at a high velocity for further calcining of the raw kiln materials and burnout of the SWDF material.

25 The apparatus of claim 23 including a feed hopper included in said waste feed system for accumulating shredded SWDF material, and a force feeder for feeding said shredded SWDF material from said hopper to said combustion chamber; and a feed conveyor for conveying said SWDF material to said feed hopper in a shredded form.

26. The apparatus of claim 25 wherein said force feeder includes an auger feed having a compression section and an expansion section wherein a plug of said SWDF material is compressed in said compression section and is released in said expansion section for feeding into said combustion chamber to fall freely as loose shredded material through a feed outlet into said combustion chamber.

27. The apparatus of claim 26 including a first shutoff gate disposed between said compression section and said expansion section of said auger feed; and a second shutoff gate disposed near said feed outlet of said auger feed, said shutoff gates being operable to open and close the feed of SWFD material through said auger feed.

28. The apparatus of claim 27 wherein said first shutoff gate has an open position to allow feed of SWDF material through said auger feed and a closed

position to block the feed of SWDF material to said expansion section; and said second shutoff gate has an open position to allow feed of SWDF material to said auger feed outlet and a closed position to block the feed of SWDF material to said auger feed outlet; and a controller for controlling the open and closed positions of said first and second shutoff gates.

29. The apparatus of claim 28 wherein said controller positions said first and second shutoff gates in their closed positions in response to a controller input to shut down the SWDF feed system so that hot combustion gas and fire from the combustion chamber are not allowed to flow backward through the feed system, and said controller operates said auger in a reverse operation prior to moving said first and second shutoff gates to said closed positions to release the compression of said compressed plug.

30. The apparatus of claim 29 including a fuel conditioner bin for containing fuel conditioner; and a bin outlet for feeding said fuel conditioner into said hopper of said feed system for mixing with said SWDF material to enhance its flowability.

31. The apparatus of claim 30 including a control valve disposed in the outlet feed of said fuel conditioner bin to control the flow of fuel conditioner into said feed hopper of said feed system; and said controller controlling the control valve of said fuel conditioner bin feeder upon receipt of a controller input to close down said combustion chamber to apply a sufficient amount of fuel conditioner to cover the top

of said SWDF material in said hopper feeder to prevent combustion air from entering the hopper.

32. In a calciner kiln having a preheater for preheating raw kiln material, a calciner for calcining the raw kiln material and a rotary kiln for burning the calcined raw cement material to produce clinker which is eventually cooled in a clinker cooler, said rotary kiln having a charge end and a discharge end, and a riser duct connecting said calciner and the charge end of said rotary kiln for receiving hot kiln gas flowing from said charge end, a calciner and waste material feed system for continuously burning solid waste derived fuel (SWDF) material in said calciner to fuel at least part of the calcination process comprising:

a calciner having a calciner duct with an in-line calciner duct in an in-line flow relationship with hot kiln gases flowing through said riser duct at a high velocity;

an air inlet for introducing combustion air into said calciner having an oxygen content generally equal to ambient;

a raw material inlet for introducing raw kiln material into said calciner;

a SWDF material feed system for introducing SWDF material into said calciner;

said SWDF material being burned in said calciner in the presence of said raw kiln material to facilitate calcination of the kiln material with the heat and by-products of burning and said calcined kiln material being introduced into the high velocity hot kiln gas flow in a zone generally above said riser duct;

whereby said SWDF material and calcined kiln material continue any necessary burnout and calcination in said calciner duct.

33. The apparatus of claim 32 wherein said calciner includes a calciner combustion chamber where the burning of said SWDF material is initiated by a burner flame produced by a control fuel in the presence of said raw kiln material whereby said SWDF material and said control flame produce calcination heat at a controlled temperature; and a connector duct connecting said calciner combustion chamber to said in-line calciner duct at said zone whereby hot combustion gas from said combustion chamber is added to said hot kiln gas to achieve a complete burnout of the SWDF material and complete calcination of the raw kiln material.

34. The apparatus of claim 32 wherein said SWDF feed system includes a feed conveyor for conveying loose shredded SWDF material to a feed hopper, said shredded SWDF material being fed from said feed hopper into said calciner.

35. The apparatus of claim 34 including a housing enclosing said feed conveyor; and including means maintaining an inert gas atmosphere within said enclosure to prevent combustion of said conveyer SWDF material.

36. The apparatus of claim 35 wherein said conveyor includes an upper conveyance run wherein said conveyor belt is open for conveying loose shredded waste material for delivery, and a closed lower run in which opposing edges are folded to form a belt enclosure wherein any residual loose material is prevented from falling into the housing.

37. The apparatus of claim 34 including a conveyor controller for controlling the feed rate of SWDF material to said feed hopper so that a desired fill of SWDF material is maintained in said feed hopper.

38. The apparatus of claim 34 including a fuel conditioner bin for feeding fuel conditioner into said feed hopper to improve the flow ability and dryness condition of said shredded SWDF material.

39. A method for feeding and burning solid waste derived fuel (SWDF) material for the calcination of raw kiln material in the manufacture of cement clinker, which clinker is manufactured by a process by which raw kiln material is preheated in a preheater, calcined in a calciner, burned into clinker in a rotary kiln, where after the clinker is eventually cooled in a cooler, said method for feeding and burning the SWDF material during the calcining process comprises:

introducing the SWDF material into a calciner having a combustion chamber;

introducing the raw kiln material into the combustion chamber;

burning the SWDF material in the combustion chamber in a high oxygen atmosphere at a controlled temperature to achieve a generally complete combustion and calcination of said raw kiln material;

feeding the combustion gas from the combustion chamber and the calcined raw meal into an in-line duct of the calciner wherein the combustion gas mixes with hot kiln gas flowing from the rotary kiln so that the heat from combustion

chamber gas and hot kiln gas complete any necessary combustion of SWDF material and calcination of raw kiln material.

40. The method of claim 39 including feeding the SWDF material in a shredded form to a feed hopper, feeding the SWDF material from the feed hopper to a feed outlet at a controlled rate so that loose shredded SWDF material is distributed into the combustion chamber.

41. The method of claim 39 including feeding the SWDF material to a feed hopper in the form of shredded material, feeding the SWDF material from the feed hopper to an auger feed having a compression section and an expansion section; and compressing the SWDF material to form a compressed plug in the compression section; and releasing the compressed plug of SWDF material in the expansion section so that the SWDF material in the form of loose shredded material falls through an auger feed outlet into the combustion chamber.

42. The method of claim 41 including controlling the flow of SWDF material through said auger feed by placing a first shutoff gate at an end of said compression section and placing a second shutoff gate near said feed outlet so that said first and second shutoff gates can be closed to block the flow of hot gases and fire from the combustion chamber into the feed hopper during shut down of the combustion chamber.

43. The method of claim 42 including providing a fuel conditioner bin containing fuel conditioner which is mixed with said SWDF material in said feed hopper to increase the flowability of said SWDF material.

44. The method of claim 43 controlling the feed of fuel conditioner to the feed hopper to mix with said SWDF material including controlling the feed of fuel conditioner to the feed hopper during shut down of the combustion chamber to smother the SWDF material in the feed hopper to prevent combustion.

45. The method of claim 39 including conveying said SWDF material to said feed hopper; controlling the feed rate of said SWDF material on the conveyor, and controlling the feed rate to maintain a prescribed fill of SWDF material in the feed hopper during operation of the combustion chamber.

46. The method of claim 45 including enclosing the conveyor in an inert gas environment so that combustion of the SWDF material is prevented during conveyance.

47. The method of claim 46 including using a conveyor belt having an open configuration for conveying the material on an upper run, and a closed configuration retaining any residual material on a return run of said conveyor belt.

48. The method of claim 39 including feeding raw kiln material into the combustion chamber by collecting said raw kiln material in an intermediate stage cyclone and feeding the collected raw kiln material to the combustion chamber directly.

49. The method of claim 39 including introducing tertiary air from the clinker cooler into the combustion chamber to provide an ambient high oxygen atmosphere in said calciner combustion chamber for combustion.